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A30. Effect of elevated CO_2 and temperature on polar *Chlorella*

The release of CO_2 and other greenhouse gases into the atmosphere has resulted in the rise of global surface temperature and are likely to have significant effect on the algal populations. Polar microalgae are important biotic component that form the basis of the food chains in polar ecosystem. Adverse impacts of global warming on microalgae will affect organisms at the higher trophic levels. In the present study, two strains of *Chlorella* isolated from Antarctic (*Chlorella* UMACC 237) and Arctic (*Chlorella* UMACC 263) waters were exposed to 4°C+370ppm CO_2 (control), 4°C+750ppm CO_2 (increased CO_2), 8°C+370ppm CO_2 (increased temperature) and 8°C+750ppm CO_2 (increase temperature and CO_2). Interactive effects of elevated CO_2 and temperature were examined on the growth response, chlorophyll *a* content, carotenoid content, lipid content and photosynthetic performance of both *Chlorella*. Results showed that the Antarctic *Chlorella* was more favorable to grow at 8°C as it obtained higher specific growth rate, chl-*a*, carotenoid contents, $rETR_{max}$ and photoadaptive index (E_k) compared to those grown at 4°C. Besides, Antarctic *Chlorella* grown at 4°C+370ppm CO_2 had lower value of maximum quantum yield (Fv/Fm) compared to other treatments throughout the experiment period, indicating that this *Chlorella* was under stress in this condition. However, its value showed no significant difference at the end of the experiment. Increase CO_2 level had increased photosynthetic efficiency and lipid production in Antarctic *Chlorella*. On the other hand, the Arctic *Chlorella* grew better at 4°C as indicated by higher specific growth rate, chl-*a* and carotenoid contents. No significant difference was observed in Fv/Fm, $rETR_{max}$ and E_k at different CO_2 concentrations. However, higher alpha value at 370ppm CO_2 may indicate that the Arctic *Chlorella* is more efficient in photosynthesis at lower CO_2 concentration.